CE

Operating Manual

Ex pz System F-320

E+L Type DW 60001

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1 Introduction

1.0 Features of ELB Controller F-321T

- Unique patented *Purgesafe*® function discovers a possible necessity of purging and carries it out automatically
- Robust encapsulated electronic circuits, high precision pressure and flow sensors (resolution: 5 Pa = 0,05 mbar)
- Acid-, sea-water- and oil-proof glass reinforced plastic housing, free of corrosion even for off-shore applications (IP66 approved)
- Two line high contrast STN LCD text display with LED backlight
- Acrylic glass lens in the front cover, magnifying the LED display
- Self-explaining patented user tool Wheel-Shuttle® for quick modifications of parameters without reading the manual
- High-Flow™ technology for short purging times even of big enclosures
- Power relay contacts accessible on Ex e clamps for direct contacting of big loads with cables of up to 4 mm^2 (12 AWG) wire gauge
- Ex i connector for temperature sensor in order to control the enclosure temperature by air flow

1.1 General Information on Types of Protection

In hazardous areas of Zones 1 and 2, only certified electrical equipment with the types of protection Ex d (flameproof), Ex e (increased safety), Ex i (intrinsic safety) and Ex pz (pressurized apparatus) shall be used. For some types of electrical equipment, the type of protection Ex pz is the simplest and most economical, and in certain cases it is the only possible one.

1.2 Pressurized Apparatus

In the case of pressurized apparatus for category 3 (Ex zone 2), there are two basic modes: (a) operation with compensation for leakage losses, and (b) operation with continuous purging (a continuous flow of protective gas). In both cases, the enclosure must be protected according IP 54 at least, we recommend IP 65.

1.2.1 Operation with Compensation for Leakage Losses

In this mode a sufficient flow of compressed air or inert gas is provided to compensate for the leakage of the enclosure and to maintain a minimum overpressure in relation to the surrounding atmosphere.

The minimum overpressure allowed for pressurized apparatus of 0.25 mbar (25 Pascal) can easily be read from the display of the F-321T controller. Two independantly programmable potential free power relay contacts may be connected with different warning devices (flashlights, indicator lamps, acoustic devices ...) to signalize a pressure beneath the minimum value in the enclosure, to send a respective message to a master controller or to switch off non-Ex devices inside of the enclosure.

Optionally an initial purging can be performed, in order to remove a potentially explosive gas mixture of the surrounding atmosphere from the enclosure. For this purpose the F-321T controller provides terminals 8-10 for connection with an external purging valve together with a freely programmable purging time counter (0-255min.).

1.2.2 Operation with Continuous Purging

In this mode, the enclosure is purged continuously with compressed air or inert gas, e.g. in order to dissipate the heat generated in the enclosure. The air outlet of the control unit can end in the hazardous area; this is specially certified for this purpose. Optionally the controller can be supplied with an certified particle barrier for pre-purging or cooling.

During purging and also at normal operation, an overpressure of at least 4 mbar (400 Pascal) is maintained.

1.3 Ex pz Controller F-321T...

F-321T... purges an enclosure with five times the free volume of the enclosure (according to EN 60079-2) and controls the minimum overpressure as prescribed (25 Pa = 0,25 mbar). Freely programmable relay contacts may as well disconnect non-Ex devices from their supplies as report pressure values to a master control.

Additionally the F-321T controller provides contacts for an ATEX approved magnetic valve for fully digital control of the start procedure and automatic compensation of leakage losses of the Ex pz enclosure during operation to prevent an ingress of the surrounding atmosphere safely, which could contain an explosive gas mixture, or in Zone 22 applications, explosive dusts.

Optionally a temperature sensor can be connected with an external 5-pole socket.

After delivery this 5-pole socket is water and dust tight closed by a plastic stopper (IP66). This stopper must be removed to connect the electrical plug.

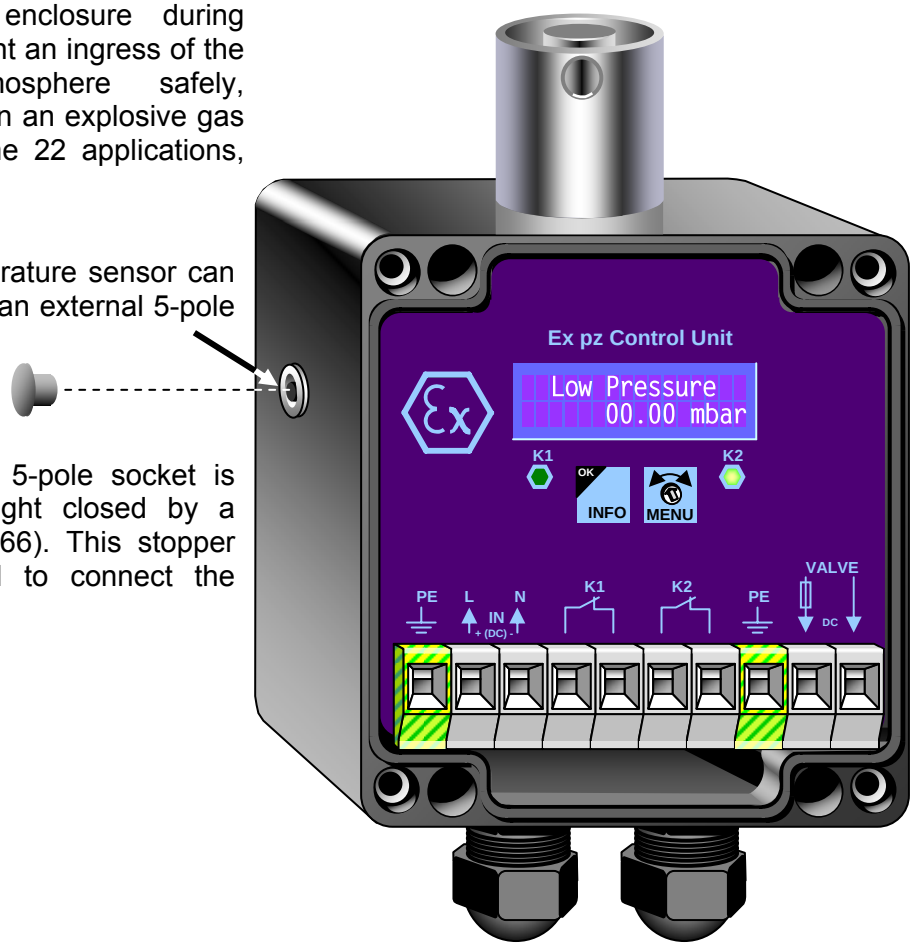


Fig 1: View with removed front cover

2 Safety Information and Notes

2.1 Storage of this Manual

Keep this user manual safe in the vicinity of the controller. Inform all persons who have to work on or with the controller where the manual is kept.

2.2 List of Notes

The notes provided in this chapter provide information on possible dangers to the lives and healths of persons (Danger, Warning), damage to property (Caution), malfunctions at the machine or in the vicinity (Important) and optimum use of the units (Information).

The notes listed in their entirety here are repeated at the corresponding points.

Warning	**Before making any other electrical connection, link up the protective earth terminal and a protective earth conductor.**

Warning!	**- Electrostatic hazard -** **Clean only with a moist cloth and detergent**

Important	**Before switching on, ensure that the operating voltages of the control unit and the digital/proportional controller correspond to mains voltage.**

Important	**Ensure that only fuses of the specified type and the appropriate current rating are used as replacements. Jumpering or bypassing of fuses or back-up fuses is inadmissible on principle.**

Important	**Before setting the units to work, read the technical documentation carefully.**

Important	**The latest version of the technical documentation or the corresponding technical supplements is valid in each case.**

Important	**Installation, maintenance and cleaning of the units must only be performed by persons trained and authorized for this purpose, insofar as they are familiar with the units.**

Important	**For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the applicable ordinances and provisions concerned with explosion protection (VDE 0160, VDE 0165 or EN 60079-14, EN 60079, EN 61241) as well as the Accident Prevention Regulations.**

Caution	**Whenever you open covers or remove parts – except if this is easily possible by hand – it is possible that electrically live parts may be exposed. Even terminal components may be electrically live.**

Caution	**The units comply with the state of the art and must only be connected to systems which have been approved for this purpose by E.L.B. Ex-Geraete Bachmann GmbH.**

Caution	**It is prohibited for the operator or his staff to open the units. This may only be done by specifically authorized personnel of E.L.B. Ex-Geraete Bachmann GmbH. E.L.B. Ex-Geraete Bachmann GmbH is not liable for any subsequent damage.**

Caution	**Modifications and conversions to the units are not permissible and will cause the Ex protection and the guarantee to become void. E.L.B. Ex-Geraete Bachmann GmbH is not liable for any subsequent damage.**

Caution	**The operating voltage of the units shall only lie within the limits specified in the technical documentation under Technical Data. E.L.B. Ex-Geraete Bachmann GmbH is not liable for any subsequent damage.**

Caution	**The technical data specified for the hazardous area comply with the values certified in the European Ex approval. The user bears the sole responsibility of examining the equipment with regard to its suitability for the intended application and environmental conditions. E.L.B. Ex-Geraete Bachmann GmbH accepts no liability for any lack of suitability.**

2.3 Notes as per Ordinance on Hazardous Materials

According to the Waste Disposal Law of 27.8.1986 (AbfG. §11 Hazardous Wastes), the owner of hazardous wastes is responsible for their proper disposal. At the same time, according to the Ordinance on Hazardous Materials of 1.10.1986 (GefStoffV §17 General Responsibility for Protection), the employer has the duty of protecting his staff from danger. We must therefore point out that:

(a) All units and/or systems sent to E.L.B. for repair must be free of any hazardous materials (acids, alkalis, solutions, potentially explosive gas mixtures etc.).

(b) All units and/or systems sent to E.L.B. must be treated so that they do not contain any dangerous fluids or other hazardous materials. For this reason, in the case of units or systems which have come into contact with hazardous working materials (see the Ordinance on Hazardous Materials – GefStoffV), these materials must be neutralized appropriately.

(c) In the event that service and repair is required, the measures described under (a) and (b) must be confirmed **in writing**.

(d) Costs incurred through disposal of hazardous materials during a repair will be invoiced to the owner of the equipment.

3 Structure and Function

In conjunction with an enclosure with type of protection IP65 or higher, the Ex pz controller F-321T provides a pressurized apparatus that is in compliance with EN 60079-2.

For this purpose, it has all the facilities and sensors needed to monitor and control the maintaining of an overpressure within the Ex pz enclosure.

3.1 Structure

The controller consists mainly of two components which must be installed separately:

- controller F-321T...
- air inlet array, consisting of pressure regulator/manometer and air silencer, digital Ex valve with integrated replaceable fuse (only applicable in gas Ex environments)

The controller itself monitors and regulates the overpressure in the enclosure, while the air inlet array doses the air quantity needed to compensate for the leakage of the enclosure.

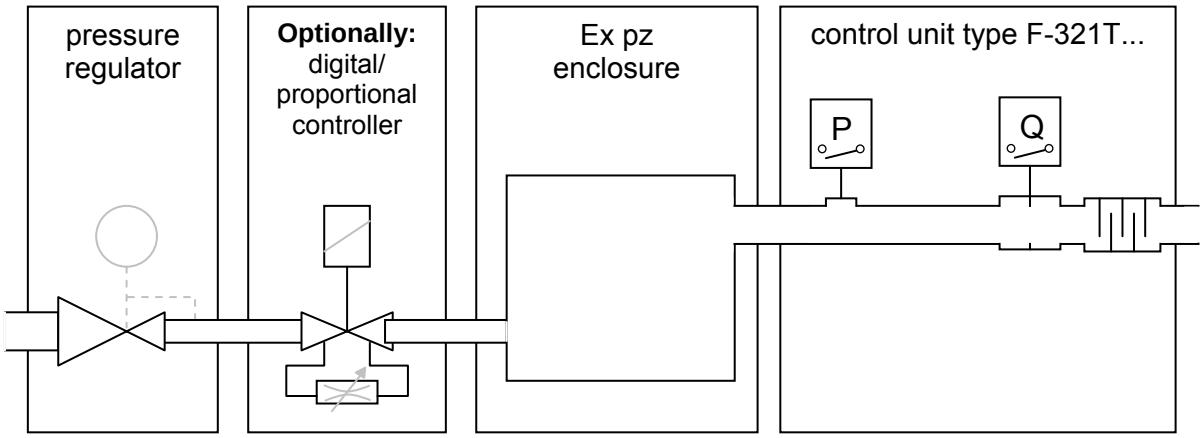


Fig. 2: Structure on principle

Optionally you can expand the F-320 system with the following components:

- a digital or proportional valve for purging or electronic control of the enclosure pressure
- an external pressure sensor
- an external temperature sensor

Important	**The latest version of the technical documentation or the corresponding technical supplements is valid in each case.**

Caution	**The units comply with the state of the art and must only be connected to systems which have been approved for this purpose by E.L.B. Ex-Geraete Bachmann GmbH.**

3.2 General Functional Description

The controller F-321T... pre-purges (optionally) and maintains, monitors, controls and regulates an overpressure of at least 25 Pa (0.25 mbar) of inert gas in the enclosure in relation to the surrounding atmosphere during operation of the devices inside the enclosure. An optional valve, which is necessary for a pre-purge may be connected to the "valve" terminals (8, 9, 10) or the isolated relay contacts K1 and K2, provided on terminals 4, 5 and 6, 7 of the control unit. Optionally the inner temperature of the enclosure can be measured and decreased by purging with cool air, if a temperature sensor is applied to the 5-pole socket shown in fig. 1.

All adjustments can be done on the front panel, which explains itself:

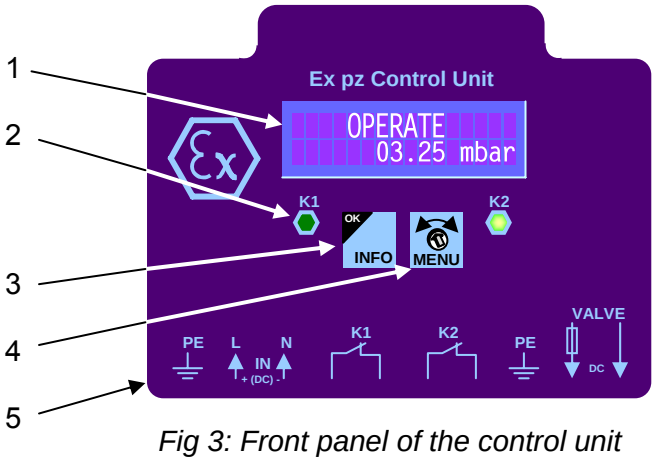


Fig 3: Front panel of the control unit

1 STN-LCD display with LED backlight, which indicates as full text the actual overpressure / gas flow or the stored limits of overpressure, purge time or temperature, on which the relay contacts K1 and K2 and the VALVE output react.

2 LEDs, which monitor the states of the relay contacts K1 and K2. A shining LED indicates that the respective contact is closed.

3 Press button to read a stored parameter (INFO) or to confirm a programmed value (OK).

4 Rotary switch (Wheel Shuttle®) to be operated with a small screw driver. Turning the switch selects the parameter or modifies its value.

5 Symbols for the terminal functions. (PE = protection earth, K = relay contact)

3.3 How to Read Parameters

The following parameters can be adjusted or indicated:

- Overpressure level, at which one of the relay contacts K1 or K2 switches over; adjustable from 0.3-25 mbar (30-2500 Pa) in steps of 0.1 mbar (10 Pa)
- Function of relay contacts K1/K2 as “n.o.” = normally open or "n.c.” = normally closed
- Purge time adjustable from 0 to 255 minutes, after which overpressure control starts
- Switch-on and switch-off delay of K1 and K2, adjustable from 0 to 60 seconds
- Minimum gas flow, from which count-down of the purge time is started, ajustable from 0.5 to 4 litres per second
- Temperature limit, at which the valve for cooling air is switched on, adjustable from 10 to 55°C, if a temperature sensor is connected with the 5-pole socket

The top of the controller case must be screwed off to operate the INFO/OK button or the rotary switch. The display however is always visible through a magnifying glass in the top of the case.

- At normal operation (= „Operate“) the display shows the measured overpressure inside of the cabinet in mbar:

- After pressing the INFO/OK button once the settings of K1 appear. The display indicates the stored overpressure limit for contact K1 to switch over and the stored switching function "nc" = normally closed or "no" = normally open.

- After pressing the INFO/OK button again the same values appear for contact K2. After delivery both contacts are programmed as „no“. Pressure limit for K1: 0.3 mbar (30 Pa); for K2: 0.5 mbar (50 Pa).

- After pressing the INFO/OK button again the display indicates the minimum temperature limit, at which a valve for cooling air connected with the terminals “VALVE” is switched on. At delivery this limit is set to 55°C. These settings are only shown, if a temperature sensor had been connected with the 5-pole socket.

- After pressing the INFO/OK button again the stored purge time appears, if it had not been set to 0 minutes. Delivery preset: 1 minute.

- After pressing the INFO/OK button again the „Settings Delay“ appear and the time delay for the relays K1 and K2 for switching over. Factory setting: 1 second.

- After pressing the INFO/OK button again „Settings PrStart“ (= Purge Start) appear together with the minimum gas flow in litres per second, from which the purge time is counted down, which you can read under “Settings Purge“. Factory setting is 1.5 l/s.

- After pressing the INFO/OK button again the display starts again with the K1 settings.

- The display will always jump back to normal operation, if you do not press the button for more than 4 seconds.

3.4 How to Modify Parameters

In order to modify the values mentioned in chapter 3.3, please select them by turning the switch MENU with a small screw driver instead of pressing the INFO-button.

- Please turn the rotary switch, until the display indicates the parameter, which you want to change. It does not matter now, in which direction you turn this switch; with every step the next parameter appears like after pressing the INFO/OK button. When you reached the desired parameter, please press the INFO/OK button.
- The display shows the same like during reading the parameters, only the first word is „Adjust“ instead of „Settings“. The display indicates the stored value. The following figures are valid for readjusting contact K1.

- As soon as the display shows the parameter to be changed, please press "OK" (= INFO/OK button) to start programming.
- The value of the parameter flashes now. In the figure above it is framed in red.
- Change this value by turning the MENU switch. Turning right increases, turning left decreases the value.
- Store the new value by pressing "OK".

For K1 and K2 „no“ or „nc“ is flashing after that.

- Chose the kind of contact „no“ or „nc“ by turning the MENU switch and store it by pressing "OK".
- After confirming the last programmable value with „OK“ the display jumps back to normal operation and indicates the overpressure.

You can always interrupt the programming procedure by not operating any switcvh for 4 seconds or conforming the existing values by „OK“ The display jumps back to normal operation then and indicates the overpressure.

no / nc
A contact, which had been programmed as "nc" (= normally closed), is closed, when the overpressure is below the programmed value. If K1 is programmed as "nc" for example and the pressure for K1 was adjusted to 10 mbar (1000 Pa), K1 will open at an overpressure of more than 10 mbar (1000 Pa).

Purge time
Purge time starts, when the air flow reaches a value, which had been stored under „Adjust: PrStart“ for the first time and maintains or exceeds this level. If the air flow falls below the programmed level for more than 4 seconds, the purge time counter resets. No contacts will switch over until the programmed purge time is not elapsed.

Purge time can be programmed from 0 to 255 minutes. If you don't want to purge your system, just set the purge time to zero. The purge time display will then not even appear in the INFO-button sequence, but still in the programming menu. Factory presetting is 1 minute.

3.5 Behaviour during powering up

Main modes
After powering up the display indicates the type of valve to be connected:

There are two main modes: „ex valve“ und „non-ex valve“, which are only important in case of an Ex pz system with a digital valve connected with the F-321T controller. After powering up the controller the programmed main mode can be read from the display as shown in the figures above. You can always switch over to the other mode by pressing the OK switch for 5 seconds.

Mode „ex valve“: F-321T controls an Ex digital valve (function: n.c = normally closed without electrical supply)

Mode „non-ex valve“: F-321T controls a standard digital valve (function: n.o = normally open without electrical supply)

Important:	**A standard valve (mode “non-ex valve) must always be mounted <u>inside</u> of the Ex pz enclosure.**

Please note, that some seconds after switching over between these modes the pressure sensors are recalibrated to 0 mbar/Pa. Thus the control unit must be without pressure and air flow and the doors of the enclosure must be open.

Actually neither switching over the type of valve nor calibrating the pressure sensors is necessary, because the controller has been programmed and calibrated in the factory.

As long as the overpressure inside of the enclosure is too low, the display indicates „Low Pressure“ now and the measured overpressure value.

Without purging (purge time = 00.00 min.), without temperature sensor

First the display shows the measured pressure difference between enclosure and ambient. As long as this pressure is below 0.25 mbar (25 Pa) „Low Pressure“ appears and the measured pressure value. Both contacts K1 and K2 are open and both lamps are off independent from the contact type programming.

As soon as the overpressure exceeds the minimum value of 0.25 mbar (25 Pa) the display indicates the purge air flow (see chapter “With Purging”). After that it switches over to „Operate“ (= operating) and indicates the overpressure again.

Relay K1 and K2 will react on this pressure according to the respective programmed pressure value, the valve output according to the enclosure temperature, if provided. If a lamp is on, the respective contact is closed. The figures show the states of lamps and display during rising overpressure with the following factory settings: K1: no; 0.3 mbar (30 Pa) / K2: no; 0.5 mbar (50 Pa).

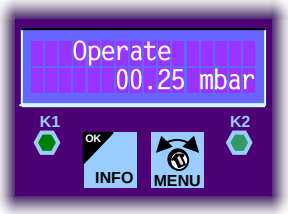
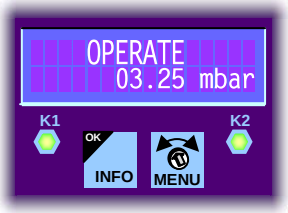


Figure on top:
Pressure below the stored levels of K1 and K2

Figure in the middle:
Pressure above K1 level, but below K1 level

Last figure :
Pressure above the levels of both contacts

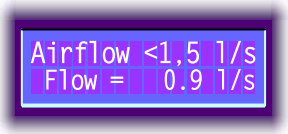


After the overpressure stays for a while below the minimal value of 0.25 mbar (25 Pa) the controller switches over from „Operate“ to “Low Pressure”, the display shows the measured overpressure, both lamps go out and both contacts K1 and K2 open again.

With purging (purge time > 00.00 min.), but without temperature sensor

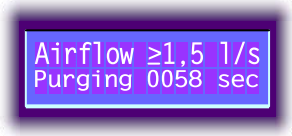
First the display shows the measured pressure difference between enclosure and ambient. As long as this pressure is below 0.25 mbar (25 Pa) „Low Pressure“ appears and the measured pressure value. Both contacts K1 and K2 are open and both lamps are off independent from the contact type programming.

As soon as the overpressure exceeds the minimum value of 0.25 mbar (25 Pa) the display indicates the purge air flow. The upper line shows whether the air flow is below or above the stored limit for the purge start (see „Adjust PrStart“). The



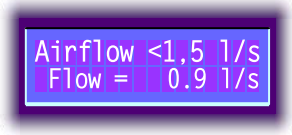
lower line shows the actual purge air flow, as long as the minimum value for purging is not yet reached.

When the minimum air flow value is reached the lower line shows the remaining purge time in minutes, in seconds during the last minute. The upper line still shows whether the air flow is below or above the stored limit.



If the air flow falls below the programmed minimum value the countdown first only stops. The number of the remaining purge time flashes. As soon as the air flow is sufficient again the countdown starts again.

If the air flow falls below the programmed minimum value for more than 4 seconds the purging is stopped. The display shows the actual air flow. Purge time countdown starts once more as soon as the minimum air flow is reached again.



When the purge time has been counted down to zero the display switches over to „Operate“ and indicates the overpressure.

If the overpressure drops to 0.25 mbar (25 Pa) or below the controller switches over to the „*Purgesafe*®“ mode. The display warns with „Check Pressure“ and flashing of the backlight and indicates the overpressure.

The controller recognizes itself whether a new purging is necessary after a period without sufficient overpressure and carries it out as soon as pressure and air flow are sufficient again.

With temperature sensor

If a temperature sensor is connected with the 5-pole socket the display shows the temperature of this sensor in one line with the overpressure, but only in the „Operate“ mode.

With „bypass“ switch

You can easily test devices, which are connected with the K1 and K2 terminals by using an external bypass switch, which enables the contacts K1 and K2 to switch over without any air pressure or air flow. The bypass switch is connected with the 5-pole socket.

However this must not be done in hazardous areas if the contacts switch on devices without explosion protection. Therefore the display warns by flashing of its backlight that the bypass key switch has been activated, and the lower line of the display shows the word „BYPASS“ independent from the controller mode.

3.6 Pressure regulator and „air inlet group“

The air inlet group, with pressure gauge and automatic venting, is mounted externally on the enclosure and is bolted in an airtight manner to the R ½ thread by the included nut. The scope of delivery includes a pressure regulator (connection R½) with all necessary mounting material, air flow nozzle with silencer, washers and nuts.

Other air inlet groups and thread diameters are available on request.

Technical Data of air inlet group
(See also fig. 4)

Dimensions (mm):	Height	113 up to ca. 135
	Width:	97
	Length:	78
	enclosure hole:	17
Thread:	R½ both sides	
Input pressure:	0.5 -25.0 bar	
Output pressure:	0.5 - 6 bar	
Max. Flow Rate:	490 l/min	
Material:	brass	
Weight:	0.56 kg	

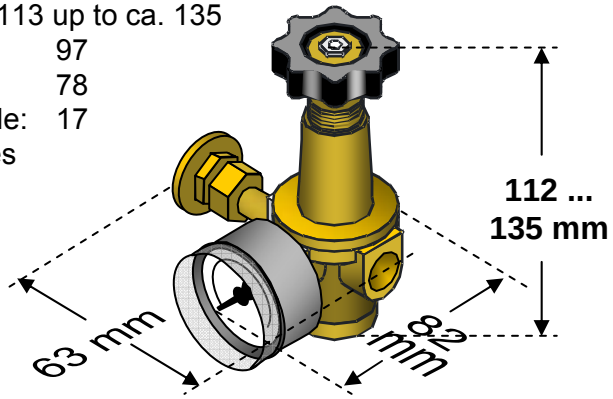


Fig. 4: Dimensions of the pressure regulator

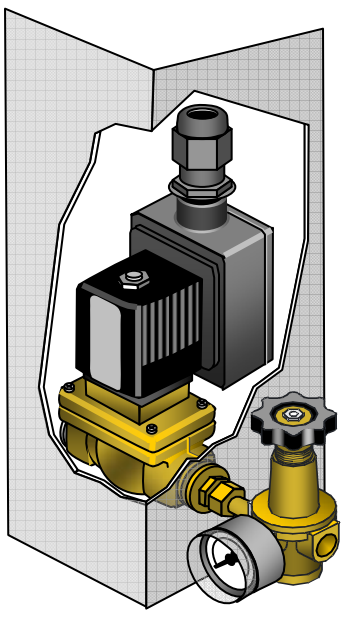


Fig. 5: Recommended arrangement for the “air inlet group consisting of pressure regulator, pressure gauge and digital valve

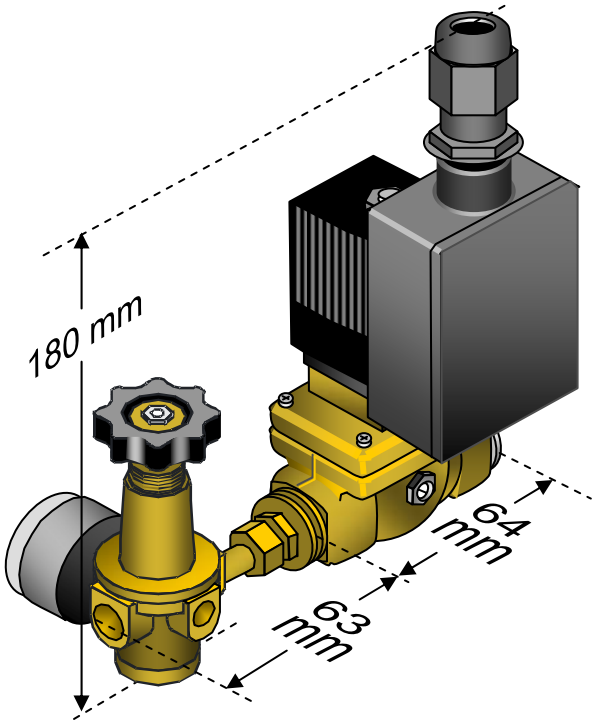


Fig. 6: Dimensions of the „air inlet group“ consisting of pressure regulator, pressure gauge and digital valve

4 Installation and Setting-to-Work

Important	**For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the ordinances and provisions concerned with explosion protection (VDE 0160, VDE 0165 or EN 60079-14, EN 60079, EN 61241) as well as the Accident Prevention Regulations (UVV).**

Important	**Installation, maintenance and cleaning of the units must only be performed by persons trained and authorized for this purpose, insofar as they are familiar with the units.**

Caution!	**Modifications and conversions to the units are not permissible and will cause the Ex protection and the guarantee to become void.** **E.L.B. Ex-Geraete Bachmann GmbH is not liable for any subsequent damage.**

4.1 Preparatory Work

Important	**Before connecting the mains supply, check the units installed in the enclosure. In particular, ensure that there is an adequate flow of air around the units and that any unit casings will be purged properly. Furthermore, ensure that the electrical units are de-energized if there is any loss of pressure. This includes the isolation of any data lines.**

4.2 Installation

It is permissible to mount the Ex pz system F-320 on or in any casing which is suitable for applications with overpressure (but at least IP 54).

Important	**The wall thickness of the casing should not exceed 5 mm.**

4.3 Mounting of Control Unit F-321T

For external mounting on an enclosure, one hole of 35 mm must be drilled for the air inlet (at the rear side of the controller F-321T), and up to 4 mounting holes for the monitoring unit itself.

Any mounting position is possible, but ensure that the display can be easily read.

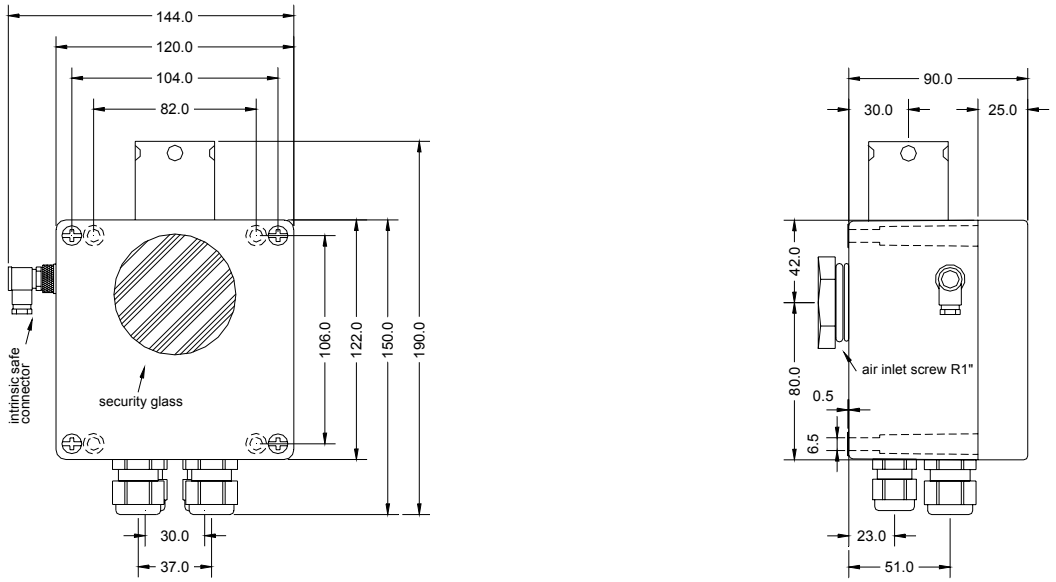


Fig 7: Dimensions of the F-321T controller

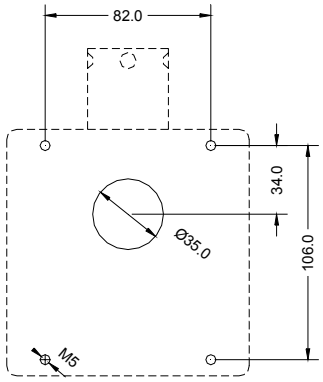
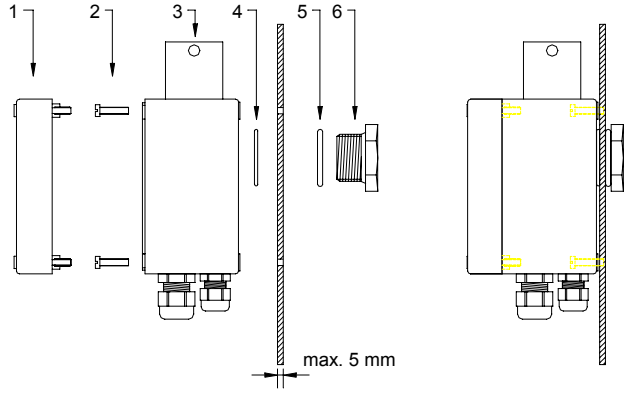


Fig 8: Mounting holes in the Ex pz enclosure



1 = top
2 = 4 screws M5x20
3 = housing F-321T
4 = rubber ring 33,7x2,2
5 = rubber ring 33,7x3,5
6 = air inlet bolt 1“

Fig. 9: for mounting to enclosures; components and their positions

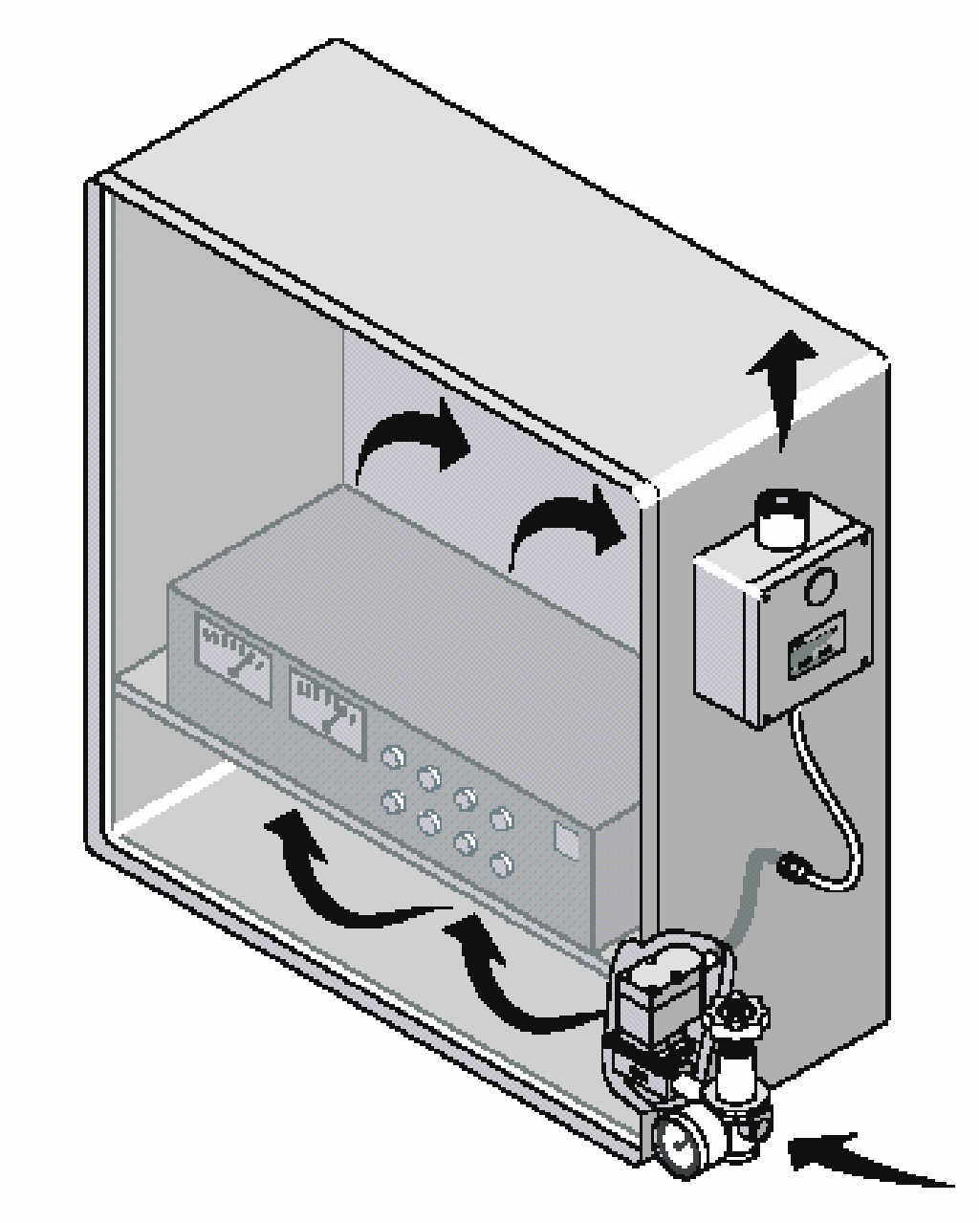
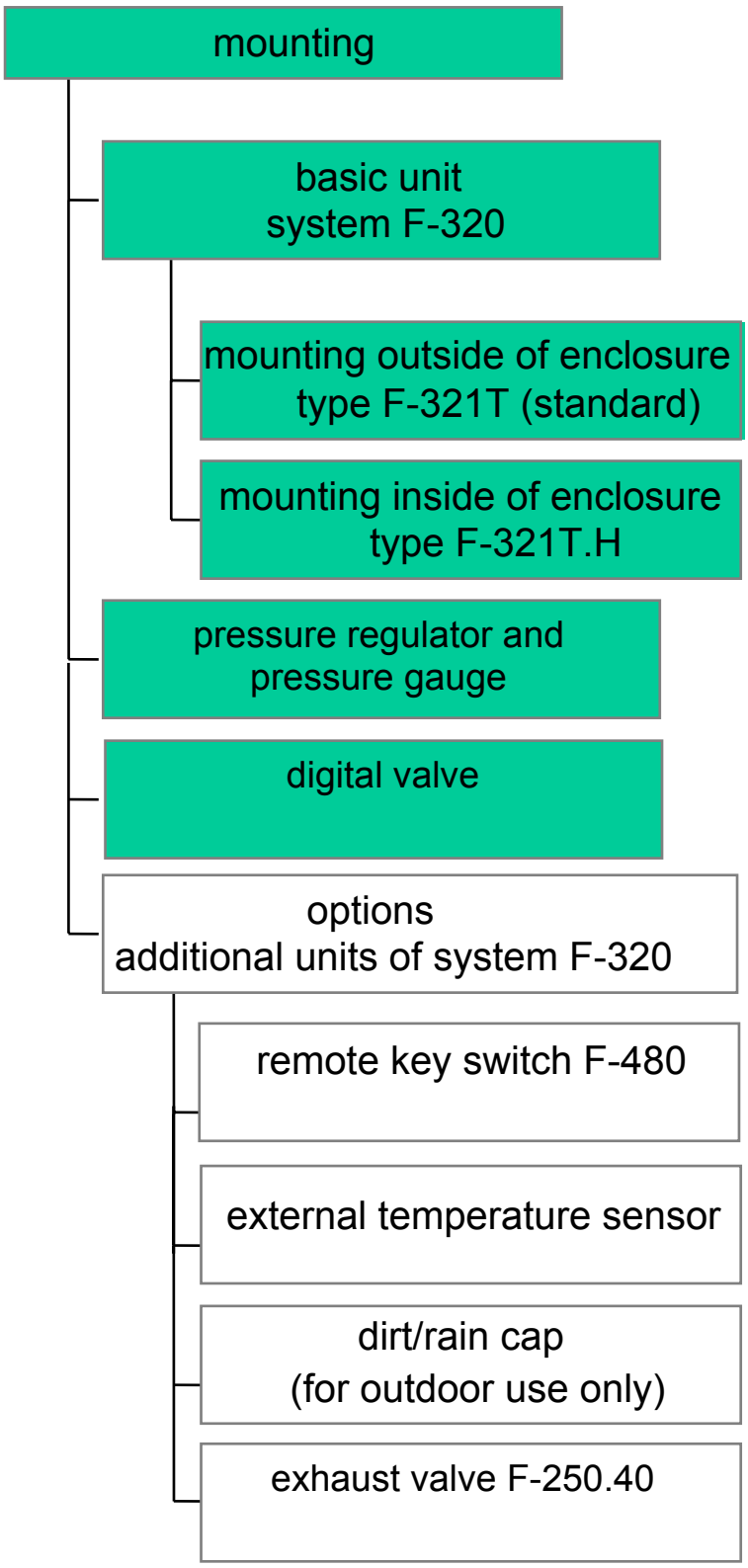
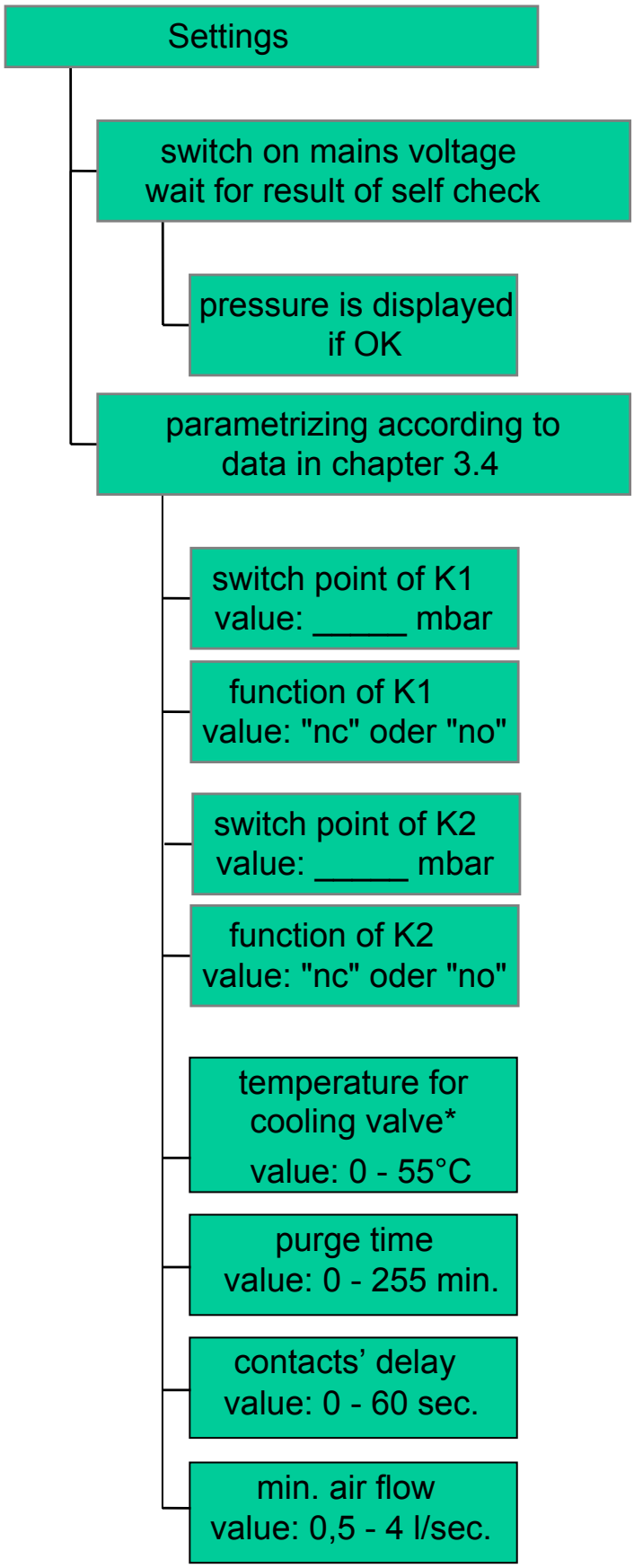


Fig.10: Proposal for mounting the controller F-321T to an Ex pz enclosure (valve is optional)

Sequence Diagram for Installation / Setting-to-Work





*if available

4.4 Setting Leakage Air Flow Rate

You can adjust the leakage air nozzle integrated into the pressure regulator at any time to the air flow rate needed to compensate for the leakage losses. The nozzle is set in the factory to an air flow rate of 15l/min for an inlet pressure of 2 bar.

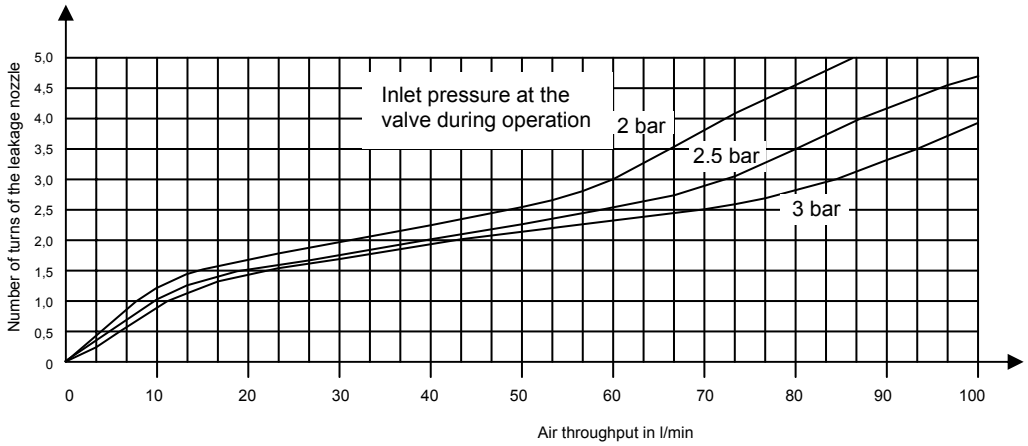


Fig. 11: Leakage air diagram

For adjustment of the air leakage compensation close the leakage air nozzle completely by turning it clockwise with a screwdriver.

Starting from this reference point you can adjust the airflow by turning the nozzle counter-clockwise. In the leakage air diagram you find the air flow (x-axis) as a function of complete screw rotations (y-axis). Open the nozzle for the amount of rotations which corresponds to the air throughput you need.

We recommend to adjust an operating enclosure overpressure of 1.5 ... 3 mbar.

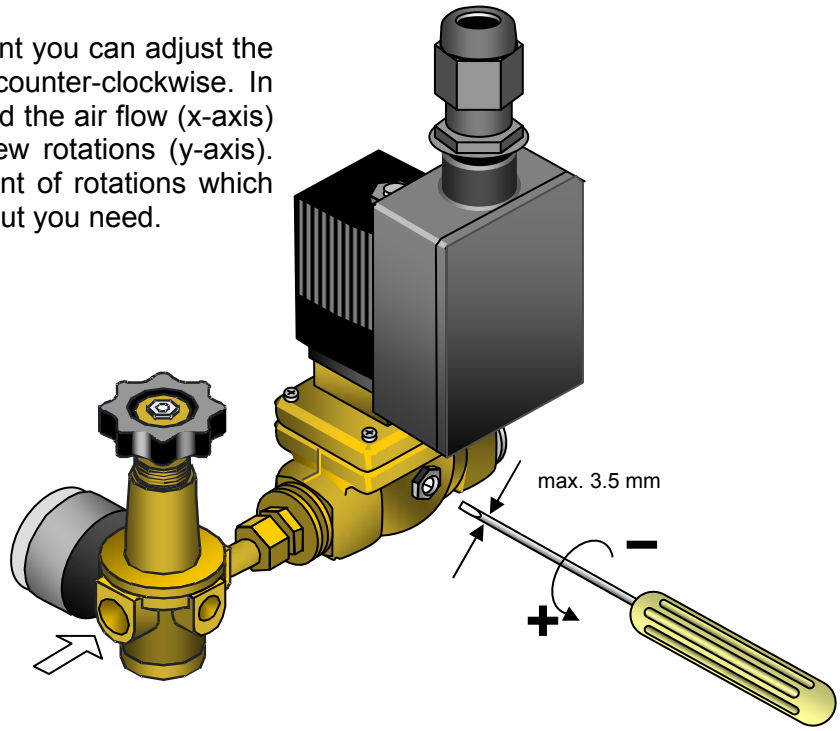


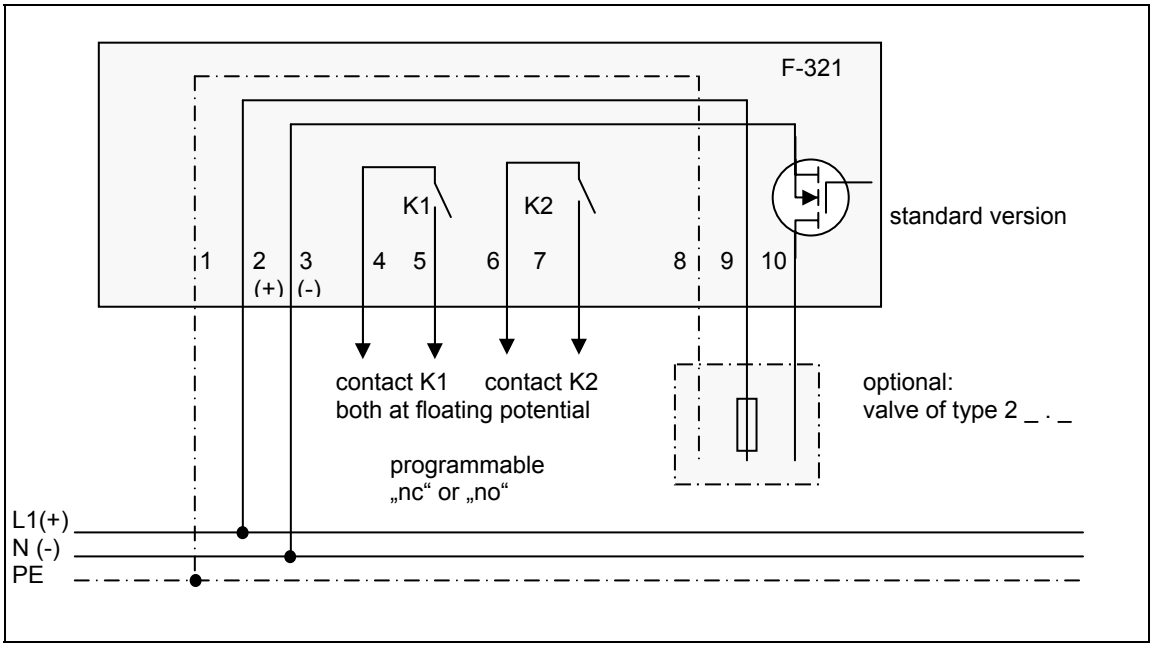
Fig. 12: Adjustment of the leakage compensation nozzle

Technical data of the pressure regulator:

Dimensions:	62 x 82 x 112 ...135 mm	Connectable pressure:	0.5 ... 25 bar
Hole in enclosure:	17 mm	Extraction pressure:	0 ... 6 bar
Weight:	0.5 kg	Flow rate (1 bar):	490 l/min

4.5 Electrical connection F-320

Important:	**Ensure that only fuses of the specified type and the appropriate current rating are used as replacements. Jumpering or bypassing of fuses or back-up fuses is inadmissible on principle.**



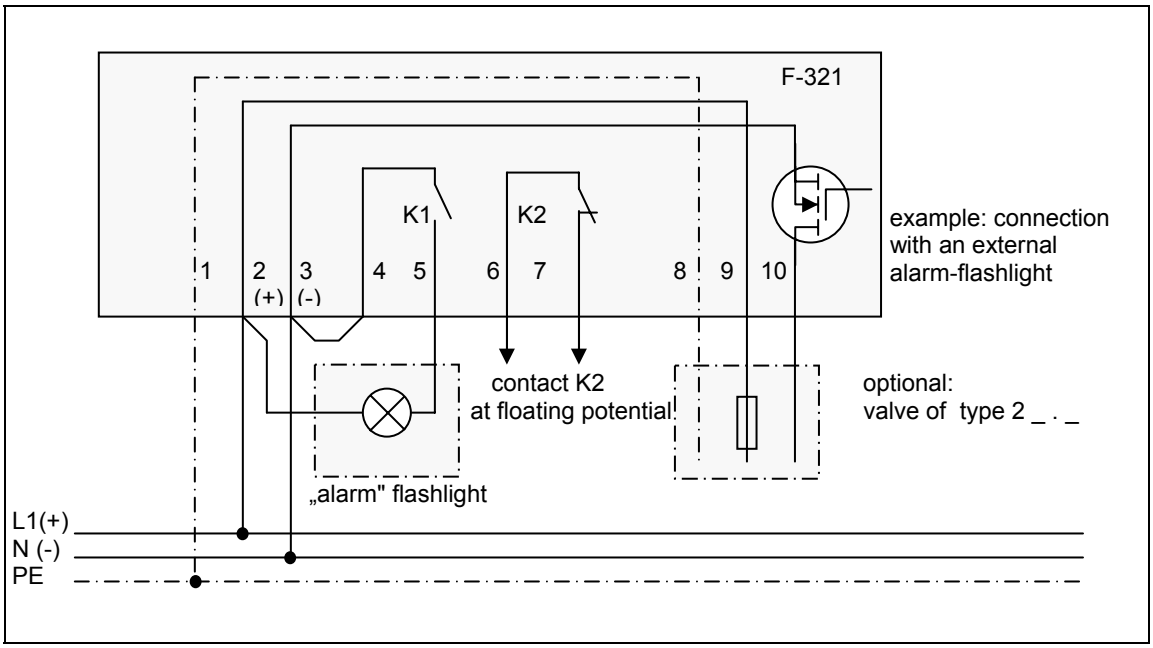


Fig. 13: Circuit diagram for controller F-321T

5 Use for the Intended Purpose

Important	**Before setting the units to work, read the technical documentation carefully.**

Important	**The latest version of the technical documentation or the corresponding technical supplements is valid in each case.**

The Ex pz controller F-321T... is built according to the state of the art and is reliable in operation. It must only be used for the intended purpose. Use for the intended purpose also includes compliance with the instructions issued by the manufacturer for installation, setting-to-work and service. The sockets must only be connected with devices, which comply with the controller and the respective protection zone concerning electrical data and protection type, and which are certified for the respective values.

Any other use is regarded as conflicting with the intended purpose. The manufacturer is not liable for any subsequent damage resulting from such inadmissible use. The user bears the sole risk in such cases.

5.1 Transportation and Storage

All units (controller, digital/proportional controller, accessories) must be so transported and stored that they are not subjected to any mechanical stresses over 1.5g, are not dropped from heights exceeding 0.3m and are not exposed to mechanical impact exceeding 3J. For the transportation and storage, the “Ambient Temperature” specified in the Technical Data shall apply.

5.2 Authorized Persons

Only persons specially trained for the purpose are authorized to handle the Ex pz controller F-321T...; they must be familiar with the unit and must be aware of the applicable ordinances and provisions for explosion protection as well as the relevant accident prevention regulations. The user can familiarize himself with the unit through training at the manufacturer, through a special familiarization session or through an “on the job” training course.

5.3 Cleaning and Maintenance

System F-320 and all its components require no maintenance and are self-monitoring. All work on the monitoring unit F-321T... and/or the digital/proportional controller by personnel who are not expressly qualified for such activities will cause the Ex approval and the guarantee to become void.

All what is needed is to regularly clean the sight glass of monitoring units mounted externally on the enclosure. Use only mild soap solutions or similar mild detergents.

Before commencing any work on units located inside the enclosure, please take care to observe the applicable regulations, ordinances and provisions.

Important	**Installation, maintenance and cleaning of the system and on all components belonging to the system must only be performed by persons trained and authorized for this purpose, insofar as they are familiar with the units.**

5.3.1 Safety Precautions

Before opening the enclosure, it is absolutely necessary to switch off the units located inside this enclosure and to secure them against renewed powering-up.

Important	**For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the applicable ordinances and provisions concerned with explosion protection (VDE 0160, VDE 0165 or EN 60079-14, EN 60079, EN 61241) as well as the Accident Prevention Regulations.**

5.3.2 Cleaning and Maintenance Intervals

The cleaning intervals depend on how dirty the system is. Please take care to ensure that the display of the monitoring unit is always easy to read.

Warning!	**- Electrostatic hazard -** **Clean only with a moist cloth and detergent**

6 Technical Data

ATEX marking acc. to EN 61241-xx (dust):	II 2 D Ex tD A21m ia IIC T4 T70°C
ATEX marking acc. to EN 60079-xx (gas):	II 2 G Ex e mb ia [pz] [ia] IIC T4 or II 2 G Ex d mb ia [pz] [ia] IIC T4
Ingress protection:	IP66
Electrical data:	U_0 = 5.35 V I_0 = 100 mA P_0 = 0.535 W L_0 = 10 µH C_0 = 47 µF keystone characteristic
Ambient temperature:	$-30°C \leq T_{amb} \leq +60°C$
Mains voltage:	• 12 VDC max. • 24 VDC max. • 24 VAC ± 10% f = 48 ... 62 Hz • 115 VAC ± 10% f = 48 ... 62 Hz • 230 VAC +8.5 / -10% f = 48 ... 62 Hz • 250 VAC +5 / -15% f = 48 ... 62 Hz
Current consumption:	30 mA at 230 and 250 V AC 60 mA at 115 V AC 300 mA at 24 V AC 250 mA at 12 / 24 V DC
Reset for mains failure:	≥ 2s
Enclosure material:	GRP, epoxy resin, black, antistatic
Dimensions (mm):	Length of enclosure: 122 Width of enclosure: 120 Height of enclosure, approx.: 94 Protrusion of air outlet: 40 Diameter of air outlet: 40 Protrusion of cable glands, approx.: 35 Cable glands: 2 x M20 x 1.5 2 x M16 x 1.5
Weight:	2.5 kg

Mechanical versions:

- Mounting outside on the enclosure
- Installation within the enclosure
- Mounting to an Ex d enclosure

Input sensors:

- internal pressure sensor
- optional external bypass key switch or temperature sensor connected to the 5-pole socket on the side

Switch points for contacts K1, K2:	0.5 ... 25 mbar 0 ... 255 min	overpressure purge time
Switch point for terminal “valve”:	5°C ... 65°C	temperature

Data of Contact Circuits according to DIN VDE 0435:

Contact voltage	Current type	Max. current	Power factor cos φ	Utilization categorie	L/R
250 V	AC	6 A / 12 A*	1		
240 V	AC	3 A	0,3	AC-15	
24 V	DC	6 A / 12 A*			0 ms
30 V	DC	2.5 A		DC-13	50 ms

*According to moulding standard EN 50028 („m“): 12 A; according to EN 60079-18 („mb“): 6 A

Terminal assignment:

1: PE (protection earth)
2 + 3: mains voltage
4 + 5: relay contact K1
6 + 7: relay contact K2
8: PE (protection earth)
9+10: valve voltage (DC output)

Admissible wire diameter: 0.2 ... 4 mm^2 (24 ... 12 AWG)

Maximum length of bare wire: 8 mm with the wire fully introduced
(No accessible metal parts admitted outside of the clamp)

Rated clamp current: 32 A at max. cross section and $T_a \leq 40°C$

Range of adjustable parameters:

Adjustable parameter	Range	Factory presetting
Relay contact K1	0.3 ... 25 mbar (30 ... 2500 Pa) ; no/nc	0.3 mbar (30 Pa) ; no
Relay contact K2	0.3 ... 25 mbar (30 ... 2500 Pa) ; no/nc	0.5 mbar (50 Pa) ; no
Temperature* for cooling valve	10 ... 55°C	55°C
Purge time	0 ... 255 min.	1 Minute
Switch over delay K1/K2	0 ... 60 s	1 second
Minimum gas flow	0.5 ... 4 l/s	1.5 litres / second

* Only with a temperature sensor connected with the 5-pole socket

7 Type Codes

Device versions:

- 12 VDC; 24 VDC
- 24 VAC; 115 VAC; 230 VAC; 250 VAC
- with external temperature sensor
- mounting inside or outside of the enclosure

The type code is interpreted as follows:

F-321T._ _

without letter:
standard version, mounting outside of the enclosure, with particle barrier

PA: for big air flows, for additional output valve*

S: for dust environments, without particle barrier

The mains voltage is printed on the respective field of the type label.
Available mains voltages with limits:
12 VDC
24 VDC
24 VAC
115 VAC ±10%
230 VAC +8.5/-10%
250 VAC +5 /-15%

The controller recognizes a connected sensor.

* Optional; please order separately

EC Declaration of Conformity

CE

We hereby confirm the conformity of the equipment listed below with the directives of the Council of the European Community. The safety and installation instructions of the product documentation must be observed.

Model:	controller F-321T...
Directive:	EMC Directive 98/336/EEC
European standard:	EN 50081-1, 3/93 EN 50081-2, 3/93 EN 50082-1, 2/96 EN 50082-2, 2/96
Directive:	Low Voltage Directive 73/23/EEC
European standard:	EN 61010-1, 3/94 EN 50014: February 2000 EN 50018: 200 EN 50019: 2000 EN 50020:1994 EN 50028: 1987 EN 50281-1-1: 1998
2. amendment:	EN 60079-0: 2006 EN 60079-1: 2004 EN 60079-2: 2004 EN 60079-7: 2003 EN 60079-11: 2007 EN 60079-18: 2004 EN 61241-0: 2006 EN 61241-1: 2004

E.L.B. Ex-Geraete Bachmann GmbH + Co,
Postal address: An der Hartbruecke 8, 64625 Bensheim,
Tel: +49 - 6251- 637 36, Fax: +49 - 6251 - 637 29,
E-Mail: info@elb.de,
Commercial Register of Bensheim, HRB Nr. 1728,
Managing Director: Steffen Bachmann

Trademark™ and registered trademark®:

High-Flow Technology ™ – trademark of the E.L.B. company. Permits low enclosure pressures even for high air flowrates.

Wheel Shuttle ® - Patent and registered trademark of the University of Dresden and the E.L.B. company. Operating and parametrization for the Ex pz controller F-321T... with simple, intuitive operator guidance.

Translation

(1) # EC TYPE-EXAMINATION CERTIFICATE

(2) Equipment or Protective System intended for use in potentially explosive atmospheres - **Directive 94/9/EC**

(3) EC-Type Examination Certificate Number

TÜV 03 ATEX 2017

(4) Equipment: System F-320 with the control unit type F-321

(5) Manufacturer: E.L.B. Ex-Geräte Bachmann GmbH & Co. KG
(6) Address: D-64625 Bensheim, An der Hartbrücke 8

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in the confidential report N° 03 YEX 196193.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997	**EN 50018:2000**	**EN 50019:2000**
EN 50020:1994	**EN 50028:1987**	**EN 50281-1-1:1998**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design and construction of the specified equipment or protective system according to Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment or protective system.

(12) The marking of the equipment or protective system must include the following:

II 2 GD EEx e m ia IIC T4 T70°C IP66 resp.

II 2 GD EEx d m ia IIC T4 T70°C IP66

TÜV NORD CERT GmbH
Hanover office
Am TÜV 1
D-30519 Hannover
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Fax: +49 (0) 511 986-1590

Head of the Certification Body

TÜV NORD CERT

Hanover, 2006-09-06

TÜV NORD CERT GmbH, Ident. Nr. 0044 legal successor of the notified body of the TÜV NORD CERT GmbH & Co. KG, Ident. Nr. 0032
German original certificate issued on 2003-01-29

**This certificate may only be reproduced without any change, schedule included.
Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH**

(13) **SCHEDULE**

(14) EC-TYPE EXAMINATION CERTIFICATE N° TÜV 03 ATEX 2017

(15) Description of equipment or protective system

The system F-320 with the control unit type F-321.... controls a pressure (e.g. an overpressure in EEx-nP-housings of the category 3, zone 2) and signals the states over output contacts; furthermore if necessary also a separately certified magnetic valve can be connected.
The control unit type F-321.... consists of an enclosure, a terminal block, a partially encapsulated control electronic, an air admittance screw connection, an air outlet and sensors for pressure and/or temperature.
The enclosure with a sight glass and the terminal block for connecting the encapsulated electronic is in the type of protection increased safety "e". The upper PCB of the control electronic is in the type of protection intrinsically safety "i" and the both PCB below are in the type of protection encapsulation "m".
The electrical connection can optionally be realised by a separately certificated cable transmit and an enclosure, both in the type of protection flameproof enclosure "d". In this case the terminal block of the electronic is not applied.
The equipment specified above is also implemented as dust-protected unit.

Permitted range of the ambient resp. flushing temperature	- 30 °C to 60 °C
Assignment of connecting terminals of the terminal block:	
Clamp 1	PE
Clamp 2 and 3	Rated Voltage
Clamp 4 and 5	break contact K1
Clamp 6 and 7	rated voltage for enable signal
Clamp 8	PE
Clamp 9 and 10	rated voltage for valves

Rated Voltages:
max. 12 V DC
max. 24 V DC
24 VAC ± 10 %, f = 48...62 Hz
115 VAC ± 10 %, f = 48...62 Hz
230 V AC + 8.5 / -10 %, f = 48...62 Hz
250 VAC + 5 / -15 %, f = 48...62 Hz

The control unit can be equipped with 3 external pneumatic measuring connections. Via 5-pin round socket a mechanical switch, a separately certified control device or sensors can be connected.

Assignment of connecting terminals of the 5-pin round socket		In the type of protection intrinsically safety EEx ia IIC with the values:
contact 1:	SSCH (switch)	U_o = 5.35 V
contact 2:	TXD (RS485)	I_o = 100 mA
contact 3:	RXD (RS485)	P_o = 0.535 W
contact 4:	VCC	L_o = 10 µH
contact 5:	GND	C_o = 47 µF
		trapezoidal characteristic line

(16) Test documents are listed in the test report No.: 03 YEX 196193.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

Translation

1. SUPPLEMENT

to Certificate No.	**TÜV 03 ATEX 2017**
Equipment:	System F-320 with the control unit type F-321T
Manufacturer:	E.L.B. Ex-Geräte Bachmann GmbH & Co. KG
Address:	An der Hartbrücke 8 64625 Bensheim
Order number:	8000553102
Date of issue:	04.09.2006

Amendments:

The 1. supplement describes the change of the upper of three PCB´s, while the other two PCB´s (center and lower) remain unchanged. It may be used a backlighted LCD display (display area 63 x 45 mm) instead of the before used digitally announcement. The upper PCB is intrinsically safe supplied. Additionally the bottom of the upper PCB lies besides in the compound, so that only the top side of the upper PCB and the display are not encapsulated.

The electrical data and all other data apply unchanged for this supplement.

The equipment incl. of this supplement meets the requirements of these standards:

EN 50 014:1997 +A1+A2 EN 50 020:2002

(16) The test documents are listed in the test report No. 06 YEX 553102.

(17) Special conditions for safe use

no additional ones

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, accredited by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the certification body

i.V. Schwedt

Hanover office, Am TÜV 1, 30519 Hanover, Tel.: +49 (0) 511 986-1455, Fax: +49 (0) 511 986-1590

BA 02 07.06 1.000.000

Translation

2. SUPPLEMENT

to Certificate No.	**TÜV 03 ATEX 2017**
Equipment:	System F-320 with control unit type F-321
Manufacturer:	E.L.B. Ex-Geräte GmbH
Address:	An der Hartbrücke 8 D-64625 Bensheim
Order number:	8000554000
Date of issue:	2007-09-27

Amendments:

The changes concern the sealing compound and the reduction of the maximum permissible switching current of the relays.
The electrical data and all other data apply unchanged for this supplement.

The equipment incl. of this supplement meets the requirements of these standards:

EN 60079-0:2006	EN 60079-1:2004	EN 60 079-2:2004
EN 60 079-7:2003	EN 60079-11:2007	EN 60 079-18:2004
EN 61241-0:2006	EN 61241-1:2004	

The marking changes as follows:

⟨Ex⟩	**II 2 G Ex mb e ia [pz] [ia] IIC T4**	**und**	**II 2 D Ex tD A21 T70°C**
		bzw.	
⟨Ex⟩	**II 2 G Ex mb d ia [pz] [ia] IIC T4**	**und**	**II 2 D Ex tD A21 T70°C**

(16) The test documents are listed in the test report No. 07203554000.

(17) Special conditions for safe use

None

(18) Essential Health and Safety Requirements

The Essential Health and Safety Requirements named in clause 1.5 of annex II of the directive 94/9/EG have not been topic of the assessment.

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, accredited by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the certification body

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